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AUTHOR Britton, Gwyneth E.; Lumpkin, Margaret C.
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ABSTRACT

A new, computerized readability assessment program was developed to verify the reading levels of stories, as designated by publishers in current sixth grade reading texts. The Spache, Harris-Jacobson, Dale-Chall, Flesch, and Fry readability formulas were incorporated into one computer-based program designed for rapid calculation and comparative analyses. Although the Spache formula was a part of this computer program, it was not applied in this study, since it was designed for grades 1-3. Approximately 200 stories were analyzed from the sixth grade reading texts. All publishers used the Dale-Chall as one indicator of readability. The Dale-Chall readability formula showed that a high percentage of the stories from the sixth grade readers were above the publishers' designated reading level of sixth grade. (Author)

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COMPUTERIZED READABILITY VERIFICATION OF TEXTBOOK READING LEVELS

AUTHORS:

DR. GWYNETH E. BRITTON

ASSOCIATE PROFESSOR, EDUCATION/READING RESEARCH
OREGON STATE UNIVERSITY
CORVALLIS, OREGON 97331

(503) 754-4721

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DR. MARGARET C. LUMPKIN

PROFESSOR OF EDUCATION, PSYCHOLOGY/WOMEN"S STUDIES
OREGON STATE UNIVERSITY
CORVALLIS, OREGON 97331

(503) 754-4841

CS 003 527

Dr. Gwyneth Britton
Dr. Margaret Lumpkin
Oregon State University

COMPUTERIZED READABILITY VERIFICATION OF TEXTBOOK READING LEVELS

Teachers are held accountable for their teaching methods and student performance in terms of demonstrated outcomes. Unless teachers have both diagnostic skills and materials correctly identified as to reading difficulty, the teaching-learning process becomes a function of chance rather than teaching expertise. Educators have explored numerous causal factors as to why some children don't learn to read ranging from the learner, the teacher, the methods, heredity, environment, race, sex, language, diet, drugs, ad infinitum. Perhaps it is time to look at the common teaching tools of textbooks more closely and focus on one vital aspect of textbooks, readability.

Readability refers to the relative difficulty of a piece of printed material. Readability formulas generally assess language variables in a written selection thereby generating an index of probable difficulty for the average reader. Readability values are commonly reported in terms of a reading grade level for each sample passage.

Answers to the following questions were sought by these researchers.

1) What formulas are commonly used by publishing houses to determine readability?

2) What sampling procedures are used by publishing houses? Is each story sampled?

3) Can readability documentation submitted by publishers in textbook briefs to textbook commissions and state departments of education be verified?

4) What percent of reading textbook stories are written at the reading grade level designated by the publisher?

5) What per cent of reading textbook stories are written at the reading grade level designated by the publisher?

6) Are textbook stories arranged sequentially in order of difficulty?

7) Are classroom teachers informed of the reading level of each story?

For purposes of this study, major readability formulas employed by the publishing trade were identified by obtaining publishing house promotional material, studying state textbook adoption briefs, and direct correspondence with the publishers. The Dale-Chall readability formula was named by each of the five publishers in this study as a determiner of their readability indices. In addition, two publishers used other formulas which were the Fry and the Harris-Jacobson. The researchers applied these three formulas and the Flesch readability formula to the textbooks analyzed.

Five current 6th grade reading textbooks were analyzed in this study and were selected on the basis of their wide distribution in the United States in addition to being fairly representative of reading textbooks available today. The textbooks selected were:

1) Economy Co., Lavender Skywriters, 6th grade, Keys to Reading Series, 1975.

2) Ginn Co., Mountains Are For Climbing, 6th grade, Reading 720 Series, 1976.

3) Houghton Mifflin Co., Impressions, 6th grade, The Houghton Mifflin Reading Series, 1976.

4) Merrill Co., Easy Going, 6th grade, Merrill Linguistic Reading Program, 1975.

Samples of approximately 100 words in length were taken from each story and then coded for a computerized readability program. A predetermined

sampling selection procedure which generally led to a selection from the second page of the story was employed to minimize a bias factor during the selection procedure. Subsequently, the passages were keypunched and the computerized analysis run using the Harris-Jacobson, Fry, Dale-Chall and the Flesch formulas. All formulas were applied to the same sample passages from each 6th grade textbook thus allowing comparison of the results among the formulas. In addition, the application of computerized technology to the process of readability assessment removed a time and accuracy barrier from theassessment procedure thus permitting the analysis of numerous samples.

ECONOMY/LAVENDER SKYWRITERS

The analysis of findings from the Economy 6th grade text Lavender Skywriters show that the reading grade level designations for the 38 story samples ranged from 4.0 to 15.0 when considering all four readability formulas. The average reading grade levels expressed by the four formulas varied from 6.8 to 8.1. The most commonly used formula, the Dale-Chall listed an average reading grade level of 7.8 for the text. The Dale-Chall indicated that 7 story samples or 18% were in agreement with the publishers designated reading level of sixth grade. According to the Dale-Chall there were 9 story samples or 23% one grade level above (+1) and 20 story samples or 53% showing 2 or more reading levels above the publisher's designated reading grade level.

The Harris-Jacobson showed 24 samples or 63% with a grade level designation of two or more (2+) grade levels above the publisher's designated grade level. There were 152 computerized readability tests calculated for the 38 Economy Company samples. The multi-formula assessment showed 80 tests or 53% of the story samples to be two or more grade levels (2+)

above the published grade level.

GINN/MOUNTAINS ARE FOR CLIMBING

The findings for the Ginn 6th grade text, Mountains Are For Climbing indicated that the reading grade level designations using the multiformula computerized analysis program ranged from 3.0 to 13.0. The Ginn Company used the Harris-Jacobson readability formula as one of their determiners of reading levels. The Harris-Jacobson readability test showed of the 37 story samples analyzed, 17 or 46% were two or more grade levels above the 6th grade or (+2). The H-J readability test also revealed that 6 story samples or 16% were one grade level (+1) above the published value of 6th grade. There were only 2 samples or 5% of the total which showed a 6th grade reading level designation.

The Dale-Chall showed 16 story samples or 43% which were two or more grade levels abovethe 6th grade.

There were 148 computerized readability tests calculated for the 37 Ginn story samples. The multi-formula assessment showed 63 readability tests or 43% of the story samples to be two or more grade levels (+2) above the published grade level.

HOUGHTON MIFFLIN/IMPRESSIONS

The Houghton Mifflin data from the 6th grade reading text Impressions, indicated that the 50 story samples showed reading grade levels ranging from 3H to 13.0. The Dale-Chall readability formula indicated that 25 story samples or 50% were two or more grade levels above the 6th grade. Furthermore, 7 samples or 14% were one grade level above the publisher's designated reading level according to the Dale-Chall formula.

The Harris-Jacobson readability test showed 9 samples with exact

agreement or 11% at the 6th grade level, 6 samples or 12% at the 7th grade level (+1), and 23 samples or 46% two or more grade levels (+2) beyond the 6th grade level.

There were 200 computerized readability tests calculated for the 50 Houghton Mifflin story samples. The multi-formula readability assessment program showed 84 readability indices or 42% two or more grade levels above the published 6th grade reading level designation.

MERRILL/EASY GOING

The Merrill 6th grade reader Easy Going indicated that 27 story samples were analyzed from the 27 different stories found in the text. Story sample grade levels ranged from 3H to 6.4 according to the four readability formulas used in this study.

The Dale-Chall formula indicated that 6 story samples or 22% were two or more grade levels above the publisher's designated level of 6th grade. Five story samples or 18.5% were assigned a 7th grade level rating or (+1), and five samples or 18.5% were assessed at the 6th grade level.

The Fry formula which Merrill Company has indicated that it uses showed that only 1 sample or 4% was two or more grade levels above the 6th grade. There were no samples listed at +1 grade level and 11 or 40% of the story samples were shown to be at grade level 6.

There were 103 readability tests calculated for the 27 Merrill story samples. The multi-formula assessment program showed 10 readability indices or 9% to be two or more grade levels above the published 6th grade reading level designation. Fifteen samples or 14% were (+1) grade level above and 34 samples or 31% were at the 6th grade level.

SCOTT, FORESMAN/VOICES, ENDEAVORS, TRIUMPHS

The Scott, Foresman 6th grade text, Voices, Endeavors, Triumphs, indicated that the reading grade levels for 42 story samples ranged from 3H to 16.0 grade levels. The average reading grade levels by formula ranged from 6.0 to 8.0 according to this multi-formula program.

The Dale-Chall readability formula showed 24 or 57% of the story samples to be two or more grade levels above the 6th grade. There were 7 samples or 17% designated as 7th grade or (+1) grade above the published designations. Five samples or 12% were shown to be at grade level.

A total of 168 computerized multi-formula readability tests were calculated for the 42 story samples from the Scott, Foresman text. The findings show that 76 readability tests or 45% of the samples were rated two or more grade levels above the 6th grade. In addition, 39 story samples showed that 23% were (+1) grade level above the 6th grade and 24 or 14% of the samples were at grade level.

SUMMARY

A total of 194 stories were analyzed using the Harris-Jacobson, Fry, Dale-Chall and Flesch readability formulas in a computerized program. Each of the 194 story samples was assessed by the four readability formulas. There were 776 computerized readability tests calculated. The computer program completed the calculations in a few minutes and summarized, averaged, ranked and displayed the data in a meaningful cogent format for the user. The use of the computer program eliminated the laborious time consuming hand calculations and concomitant inaccuracies.

The readability profile as shown in Table 1 displays a formula by formula assessment of each textbook for comparison purposes. Each story sample is

READABILITY PROFILE

PUBLISHER Economy, Ginn, Houghton Mifflin Merrill, Scott, Foresman TITLE _____ PUB. DATE 1975/1976 GRADE LEVEL(S) 6th

	NUMBER OF SAMPLES	SPACHE					HARRIS JACOBSON					FRY					DALE-CHALL					FLESCH				
		-2	-1	GRADE LEVEL	+1	+2+	-2	-1	GRADE LEVEL	+1	+2+	-2	-1	GRADE LEVEL	+1	+2	-2	-1	GRADE LEVEL	+1	+2	-2	-1	GRADE LEVEL	+1	+2
ECONOMY, 1975	38						0	6	3	5	24	1	0	9	10	18	1	1	7	9	20	0	0	2	18	18
Lavender Skywriters									8%		63%			24%		47%			18%		53%			5%		47%
GINN, 1976	37						5	7	2	6	17	5	4	7	6	15	0	6	11	4	16	0	4	11	7	15
Mountains Are For Climbing									5%		46%			19%		41%			30%		43%			30%		41%
HOUGHTON MIFFLIN, 1976	50						5	7	9	6	23	2	3	11	17	17	1	6	11	7	25	0	0	10	21	19
Impressions									18%		46%			22%		34%			22%		50%			20%		38%
MERRILL, 1975	27						12	9	3	1	2	7	8	11	0	1	3	8	5	5	6	0	2	15	9	1
Easy Going									11%		7%			40%		4%			18½%		22%			56%		4%
SCOTT, FORESMAN 1976	42						7	6	4	5	20	5	4	6	13	14	0	6	5	7	24	0	1	9	14	18
Voices, Triumphs, Endeavors									9%		48%			14%		33%			12%		57%			21%		43%
Readability Tests Calculated	776																									
TOTAL Samples	194						29	35	21	23	86	20	19	44	46	65	5	27	39	32	91	0	7	47	69	71
PERCENT							15%		11%		44%	10%		23%		33%	3%		20%		47%	0		24%		37%

Gwyneth Britton and Associates, 1054 NW Fillmore, Corvallis, Ore. 503-753-7629

placed at the readability level predicted by the specific formula. Story samples which do not agree with the publisher's designated grade level of 6th grade are identified by (+1) or (+2) or more for grades above the published level, and (-1) or (-2) for stories lower than the 6th grade reading level.

The X rating indicator has been defined in two ways. The Harris-Jacobson X indicates it is above the 8th grade level however, the discrete levels cannot be defined. Jacobson has indicated that scores above the 6th grade are based on extrapolation.[11] This fact should be recalled when an interpretation is made using the H-J formula with texts containing stories which may be above the 6th grade reading level. The Fry formula X rating can mean that is is above grade 13 or that is is beyond the limits of the Fry test. The X usually means it is beyond the limits of the test and is placed in a category according to the direction of either the upper or lower limits of the test.

CONCLUSIONS

Sampling procedures varied with each publisher. A typical procedure employed by several publishers included the sampling of a few passages for a single textbook. The readability levels from these passages were averaged into a composite grade level score for the entire textbook.

The researchers found it impossible to verify the reading levels assessed by publishers for the following reasons:

1) Sample passages were not identified.
2) Some publishing houses provided the average readability for a text without providing other identifying documentation.

The readability documentation from these publishers could not be verified for accuracy based on an adequate number of samples, nor could it be determined if bias free sampling techniques were employed in their assessment of readability.

The reading levels of the few samples included in a publisher's assessment may have been determined for those specific samples. However, the remaining stories which could number 40 or 50 stories, were not assessed. Since a sixth grade reading text typically contains 40 to 50 stories, often written by as many different authors, it can not be assumed that the unanalyzed remaining stories are at the publisher's designated reading level. The implied internal consistency could not be validated by these researchers using a sample passage from each story.

The stories in these five textbooks were not arranged in order of difficulty. Some of the most difficult stories appeared at the beginning of the text and easier stories were included toward the end of the text.

Classroom teachers were usually informed of the reading level by noting that the publishers had designated the text for a specific grade level. The most common indicator of the grade appropriate designation was the teacher's manual provided by the publisher. It usually indicated the grade level for which the text was written. A common assumption made by teachers and parents was that the 6th grade text would be appropriate for 6th grade level students reading at grade level or, if designated 5th grade, then the stories would be appropriate for a 5th grade classroom. It was found that the stories were underestimated in terms of the publisher's reading level designations. Teachers were not informed of the reading grade level for each story. They were only provided an average readability level for the text based on some type of sampling procedure. The average grade level provided by publishers could lead teachers to assume that the materials are uniform throughout. However, this research does not verify that assumption.

In spite of the limitations associated with readability formulas some standard for the determination of reading difficulty should be employed. It is time to use readability formulas in a manner which will substantially benefit the student consumer and the classroom teacher.

1) Each story or chapter should be analyzed using multiple readability formulas.

2) Readability assessment data should be provided by an out-of-house agency independent of a publisher.

3) The sample passages and readability findings should be made available to textbook adoption committees and textbooks commissions prior to the selection or adoption of textbooks.

4) The teacher's edition should contain the reading level for each story or chapter.

5) If textbooks are publicized as being arranged in a progressive sequence of difficulty, then this ought to be reflected in the readability documentation for that text.

6) Stories or chapters which are several grade levels above the grade level for which the text was intended should be deleted, rewritten or included in a more advanced text.

7) Inadequate readability samplings of 3 to 5 stories or chapters from texts that contain 50 or more selections should be unacceptable.

8) The averaging of the readability findings should not be accepted since the average masks the discrete reading level for each selection thereby giving the teacher no information for prescriptive teaching.

9) Teachers should not be expected to have to re-write edit, or analyze textbooks, in order to select the appropriate materials for a given student.

Inaccurate labeling of textbook material compounds the problems of classroom teachers who are individually prescribing for their students and assume that the textbook material is written at a certain reading level as designated by the publisher.

The student consumer represents the greatest tragedy in this arena since mislabeled textbooks impose insurmountable stresses of a continuing nature upon

this person. These stresses are expressed in frustration, boredom, diminished self-concept and self-guilt for failing to succeed.

The accurate labeling and testing of products produced in the areas of medicine, foods, chemicals, and tires has become standard procedure. The data for these products is published in detail and made available to the consumer prior to purchase.

Textbook products that shape attitudes, self-concepts, and foster the success or failure of our teachers and children need to share the same labeling and product assessment standards as do tires or a bottle of aspirin.

REFERENCES

1. Cardinell, C.F. "Rewriting Social Studies Materials to Lower Reading Levels." The Reading Teacher, November, 1976, 30, 168-173.

2. Carver, Ronald P. "Measuring Prose Difficulty Using the Rauding Scale." Reading Research Quarterly, 1975-1976, 11 (4), 660-685.

3. Coke, Esther V. and Rothkopf, Ernest Z. "Note On A Simple Algorithm for A computer Produced Reading Ease Score." Journal of Applied Psychology, June 1970, 54, 208-210.

4. Dale, Edgar and Chall, Jeanne S. "A Formula for Predicting Readability." Education Research Bulletin, January 21 and February 17, 1948, 11-20, 37-54.

5. Danielson, Wayne A. and Bryan, Sam Dunn. "Computer Automation of Two Readability Formulas." Journalism Quarterly, Spring 1963, 39, 201-206.

6. Fang, Irving E. "By Computer: Flesch's Reading Ease Score and Syllable Counter." Behavioral Science, May, 1968, 13, 249-251.

7. Farr, James N., and Jenkins, James J. "Tables for Use with the Flesch Readability Formulas." Journal of Applied Psychology, June 1949, 33, 275-278.

8. Farr, James N., Jenkins, James J. and Patterson, Donald G. "Simplification of Flesch Reading Ease Formula." Journal of Applied Psychology, October, 1951, 35, 333-357.

9. Flesch, Rudolph F. "A New Readability Yardstick." Journal of Applied Psychology, June 1948, 32, 221-233.

10. Fry, Edward B. "A Readability Formula That Saves Time." Journal of Reading, April 1968, 11, 513-516, 575-578.

11. Harris, Albert J. and Sipay, Edward R. How to Increase Reading Ability, Appendix D (6th Ed. Rvd.) New York: McKay, 1975.

12. Klare, George R. "Assessing Readability." Reading Research Quarterly, 1974-1975, 10 (1), 62-102.

13. Rosen, Ellen. "Readability Analysis of SRA Power Builders." Journal of Reading, April 1976, 19, 548-551.

14. Smith, Edgar A. "Devereaux Readability Index." The Journal of Educational Research, April 1960, 54, 289-303.

15. Spache, George D. Good Reading for Poor Readers, (Rvd., 9th Ed.) Champaign, Illinois: Garrard, 1974.